NON-CATALOG

# Frequency Synthesizer KSN-395A-1C19+

## 50Ω 395 MHz (fixed)

## The Big Deal

- Low phase noise and spurious
- Fixed frequency without external programming
- Integrated microcontroller
- Robust design and construction
- Small size 0.80" x 0.58" x 0.15"

CASE STYLE: DK1042

## Product Overview

The KSN-395A-1C19+ is a Frequency Synthesizer, designed to operate 395MHz for military and avionics application. The KSN-395A-1C19+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise.

## Key Features

| Feature | Advantages |
|---|---|
| Low phase noise and spurious:<br>• Phase noise: -107 dBc/Hz typ. @ 10 kHz offset<br>• Comparison spurious: -85 dBc typ.<br>• Reference spurious: -85 dBc typ. | Low phase noise and spurious improve system EVM (Error Vector Magnitude). |
| Robust design and construction | To enhance the robustness of KSN-395A-1C19+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer. |
| Small size, 0.80" x 0.58" x 0.15" | The small size enables the KSN-395A-1C19+ to be used in compact designs. |

*Surface Mount*

NON-CATALOG

# Frequency Synthesizer

## KSN-395A-1C19+

50Ω  395 MHz  (fixed)

### Features

- Fixed frequency without external programming
- Integrated microcontroller
- High reliability over temperature changes
- Robust design and construction
- Low operating voltage (VCC VCO=+5V, VCC PLL=+5V)
- Small size 0.80" x 0.58" x 0.15"

### Applications

- Military & avionics

CASE STYLE: DK1042

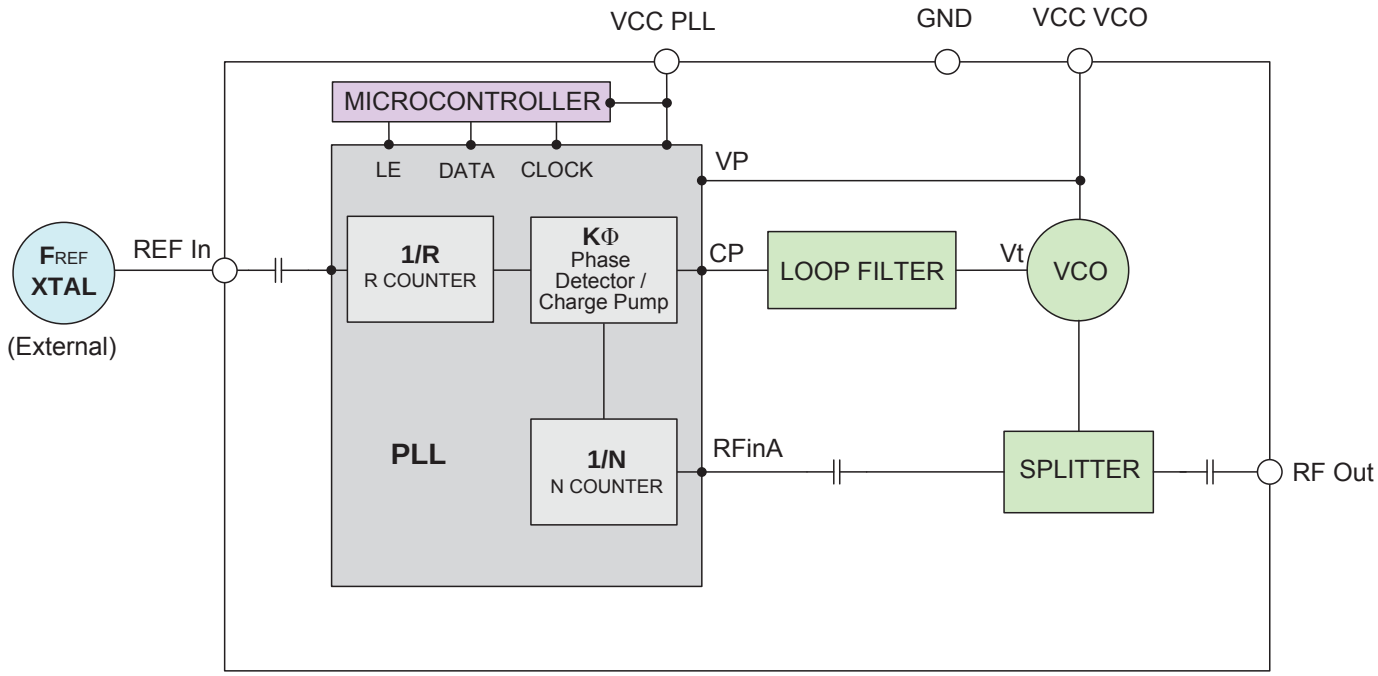
*+ RoHS compliant in accordance with EU Directive (2002/95/EC)*

*The +Suffix has been added in order to identify RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications.*

### General Description

The KSN-395A-1C19+ is a Frequency Synthesizer, designed to operate 395MHz for military and avionics application.The KSN-395A-1C19+ is packaged in a metal case (size of 0.80" x 0.58" x 0.15") to shield against unwanted signals and noise. To enhance the robustness of KSN-395A-1C19+, each internal component is secured to the substrate with chip bonder, thereby eliminating the risk of tombstoning during subsequent solder reflow operations by the customer.

### Simplified Schematic



## Electrical Specifications *(over operating temperature -40°C to +85°C)*

| Parameters | | Test Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Frequency Range (fixed) | | - | 395 | - | 395 | MHz |
| Step size | | - | - | 5000 | - | kHz |
| Settling Time (Power on to lock) | | Within ± 1 kHz | - | 20 | - | mSec |
| Output Power | | - | -3 | 0 | +3 | dBm |
| SSB Phase Noise | | @ 100 Hz offset | - | -93 | - | dBc/Hz |
| | | @ 1 kHz offset | - | -107 | -103 | |
| | | @ 10 kHz offset | - | -107 | -103 | |
| | | @ 100 kHz offset | - | -135 | -131 | |
| | | @ 1 MHz offset | - | -158 | -153 | |
| Reference Spurious Suppression | | Ref. Freq. 10 MHz | - | -85 | -70 | dBc |
| Comparison Spurious Suppression | | Step Size 5000 kHz | - | -85 | -70 | |
| Non - Harmonic Spurious Suppression | | - | - | -90 | - | |
| Harmonic Suppression | | - | - | -30 | -20 | dBc |
| VCO Supply Voltage | | +5.00 | +4.75 | +5.00 | +5.25 | V |
| PLL Supply Voltage | | +5.00 | +4.75 | +5.00 | +5.25 | |
| VCO Supply Current | | - | - | 45 | 55 | mA |
| PLL Supply Current | | - | - | 12 | 20 | |
| Reference Input (External) | Frequency | 10 (square wave) | - | 10 | - | MHz |
| | Amplitude | 1 | - | 1 | - | $V_{P-P}$ |
| | Input impedance | - | - | 100 | - | KΩ |
| | Phase Noise @ 1 kHz offset | - | - | -145 | - | dBc/Hz |
| RF Output port Impedance | | - | - | 50 | - | Ω |
| Digital Lock Detect | Locked | - | 4.35 | - | 5.15 | V |
| | Unlocked | - | - | - | 0.40 | V |

## Absolute Maximum Ratings

| Parameters | Ratings |
|---|---|
| VCO Supply Voltage | 5.9V |
| PLL Supply Voltage | 5.9V |
| VCO Supply Voltage to PLL Supply Voltage | -0.3V to +5.5V |
| Reference Frequency Voltage | -0.3Vmin,VCC PLL +0.2Vmax |
| Data, Clock, LE Levels | -0.3Vmin,VCC PLL +0.2Vmax |
| Operating Temperature | -40°C to +85°C |
| Storage Temperature | -55°C to +100°C |

Permanent damage may occur if any of these limits are exceeded

## Typical Performance Data

| FREQUENCY (MHz) | POWER OUTPUT (dBm) | | | VCO CURRENT (mA) | | | PLL CURENT (mA) | | |
|---|---|---|---|---|---|---|---|---|---|
| | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C |
| 395 | 1.01 | 0.83 | 0.12 | 41.08 | 44.18 | 45.93 | 9.88 | 11.58 | 13.27 |

| FREQUENCY (MHz) | HARMONICS (dBc) | | | | | |
|---|---|---|---|---|---|---|
| | F2 | | | F3 | | |
| | -45°C | +25°C | +85°C | -45°C | +25°C | +85°C |
| 395 | -26.77 | -30.01 | -33.42 | -26.66 | -29.85 | -30.38 |

| FREQUENCY | @TEMP. | PHASE NOISE (dBc/Hz) @OFFSETS | | | | |
|---|---|---|---|---|---|---|
| | | 100Hz | 1kHz | 10kHz | 100kHz | 1MHz |
| 395 | -45°C | -94.42 | -107.60 | -107.91 | -136.67 | -159.59 |
| | +25°C | -99.56 | -107.33 | -107.67 | -136.44 | -159.13 |
| | +85°C | -99.65 | -108.80 | -107.79 | -134.73 | -156.61 |

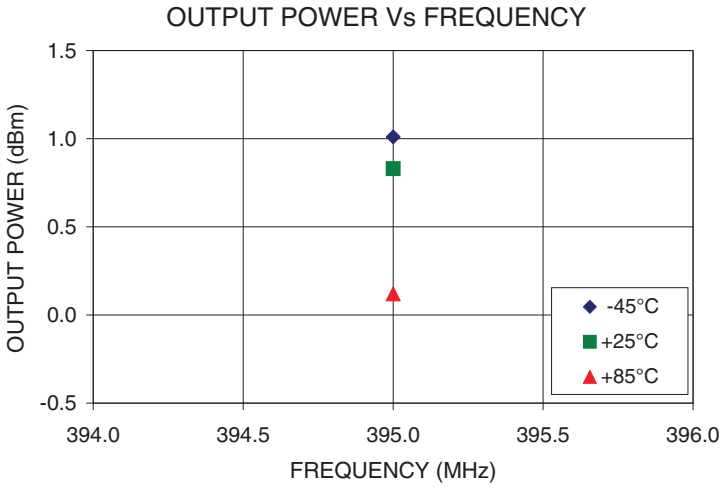
| COMPARISON SPURIOUS ORDER | COMPARISON SPURIOUS @Fcarrier 395MHz+(n*Fcomparison) (dBc) note 1 | | |
|---|---|---|---|
| n | -45°C | +25°C | +85°C |
| -5 | -83.88 | -91.85 | -89.31 |
| -4 | -93.26 | -87.51 | -89.28 |
| -3 | -86.65 | -92.75 | -106.42 |
| -2 | -89.54 | -91.32 | -95.26 |
| -1 | -76.14 | -84.59 | -91.18 |
| 0 note 2 | - | - | - |
| +1 | -80.64 | -84.59 | -90.53 |
| +2 | -86.45 | -92.79 | -90.88 |
| +3 | -79.41 | -86.16 | -91.47 |
| +4 | -86.14 | -91.12 | -88.15 |
| +5 | -89.53 | -96.34 | -92.13 |

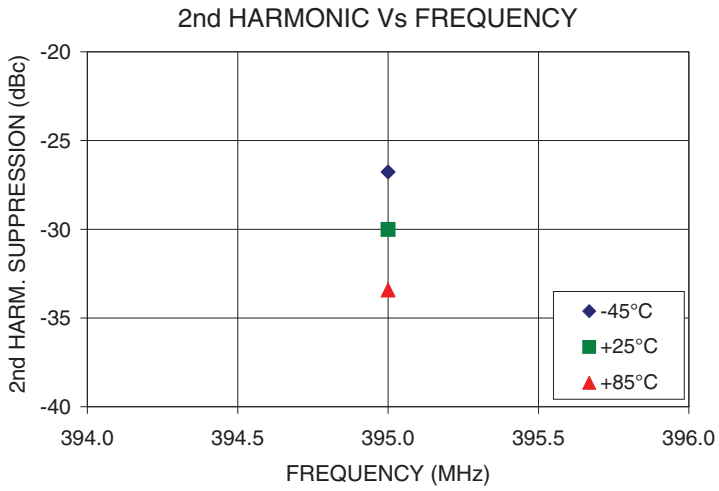
Note 1: Comparison frequency 5000 kHz
Note 2: All spurs are referenced to carrier signal (n=0).

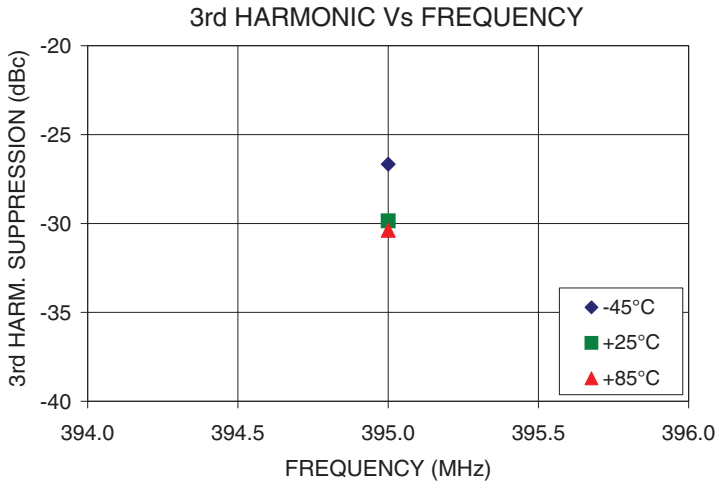
| REFERENCE SPURIOUS ORDER | REFERENCE SPURIOUS @Fcarrier 395MHz+(n*Freference) (dBc) note 3 | | |
|---|---|---|---|
| n | -45°C | +25°C | +85°C |
| -5 | -88.29 | -98.04 | -100.78 |
| -4 | -85.96 | -93.49 | -90.90 |
| -3 | -91.52 | -97.18 | -93.28 |
| -2 | -93.19 | -87.46 | -89.37 |
| -1 | -89.67 | -91.31 | -94.97 |
| 0 note 4 | - | - | - |
| +1 | -86.38 | -92.89 | -90.75 |
| +2 | -86.09 | -91.16 | -88.35 |
| +3 | -87.49 | -86.73 | -86.12 |
| +4 | -85.98 | -94.45 | -90.25 |
| +5 | -106.85 | -90.97 | -86.48 |

Note 3: Reference frequency 10 MHz
Note 4: All spurs are referenced to carrier signal (n=0).

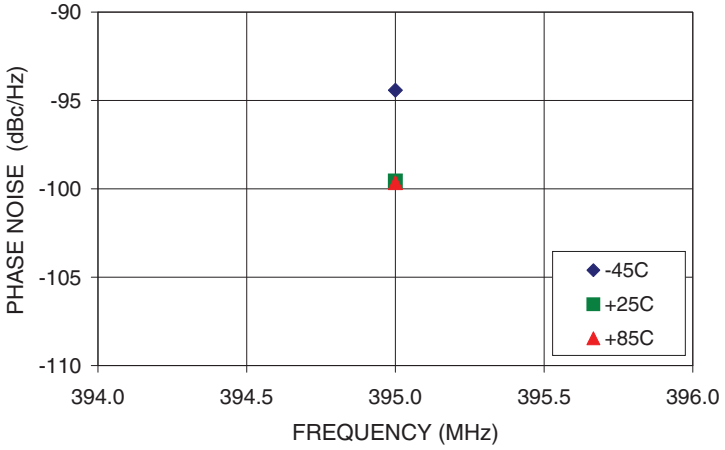
## Typical Performance Curves



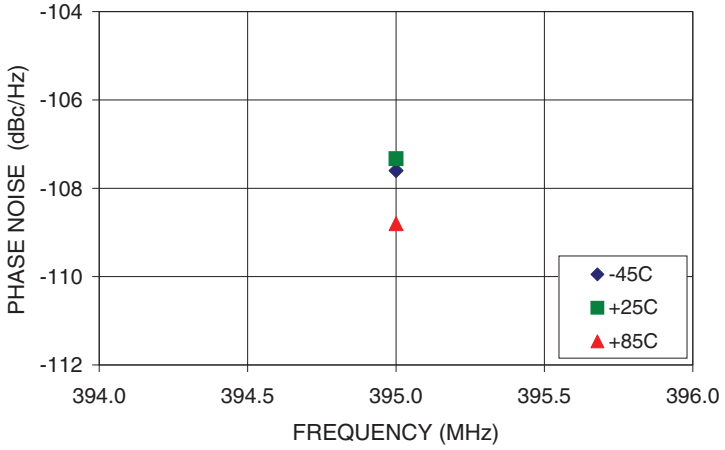



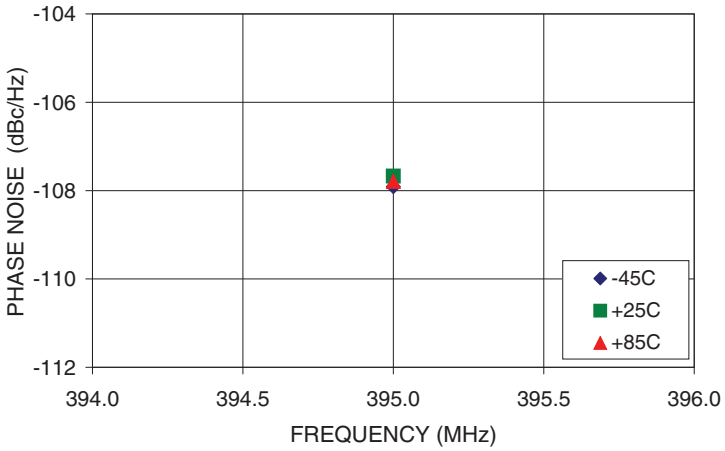
PHASE NOISE @100Hz offset



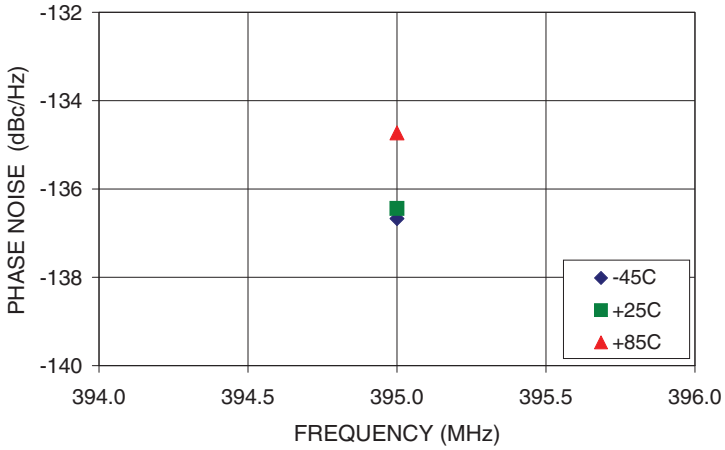

PHASE NOISE @1kHz offset



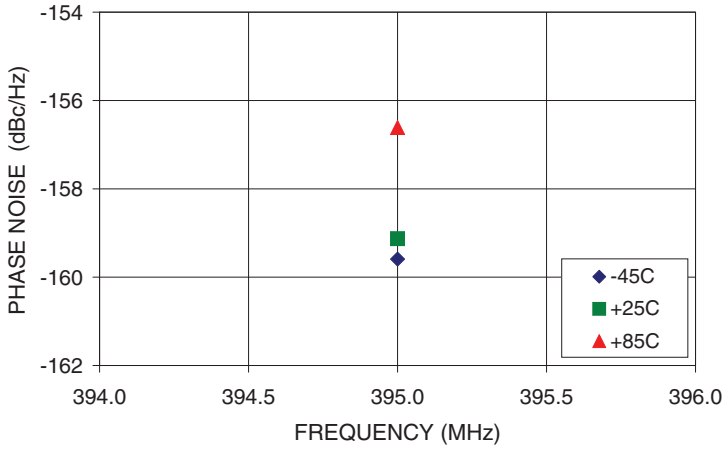

PHASE NOISE @10kHz offset

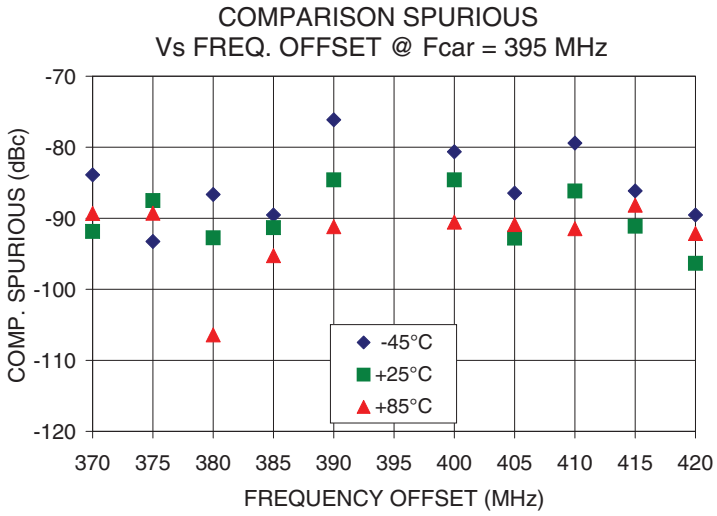


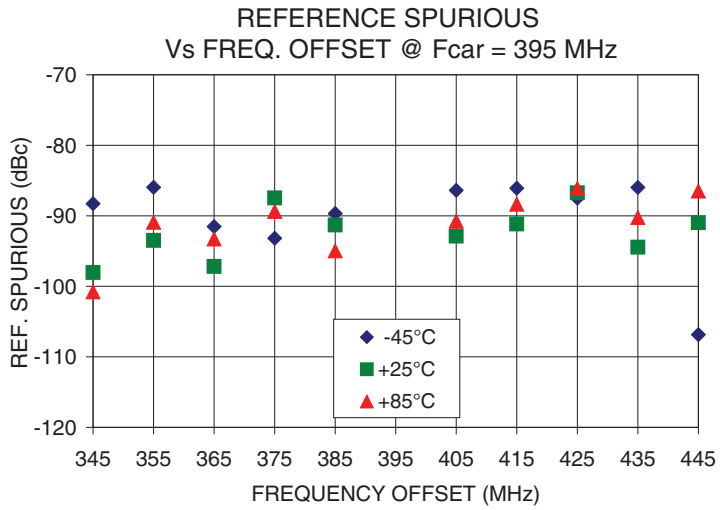

PHASE NOISE @100kHz offset



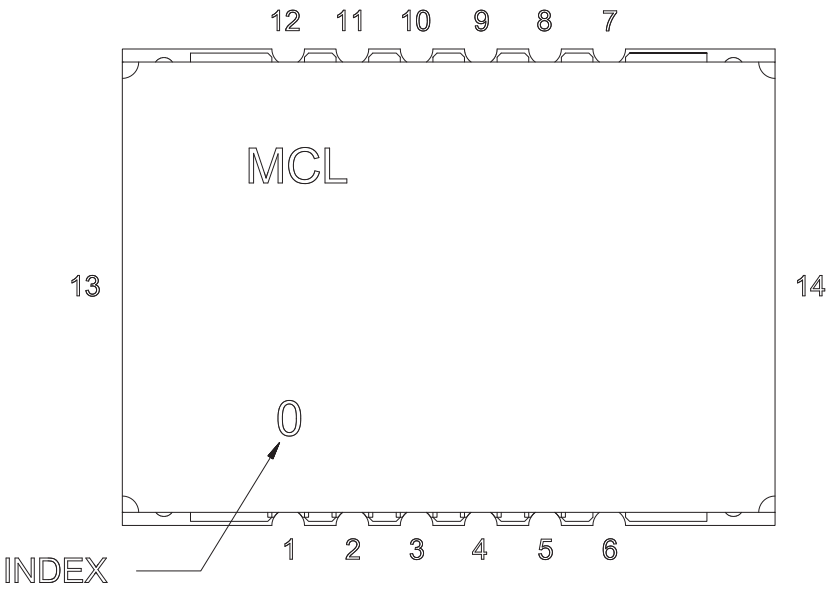

PHASE NOISE @1MHz offset





## Pin Configuration

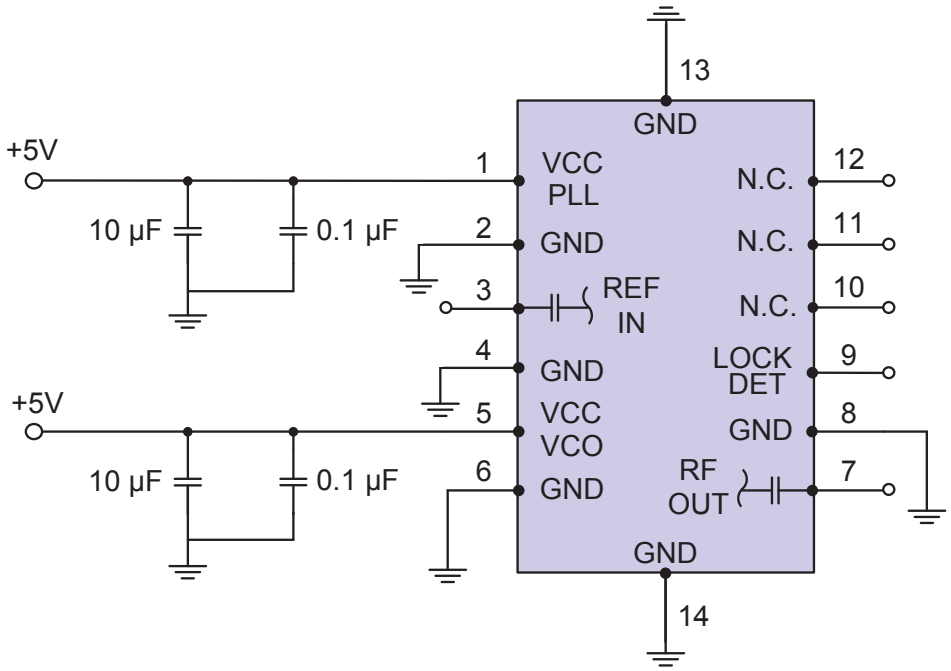



## Pin Connection

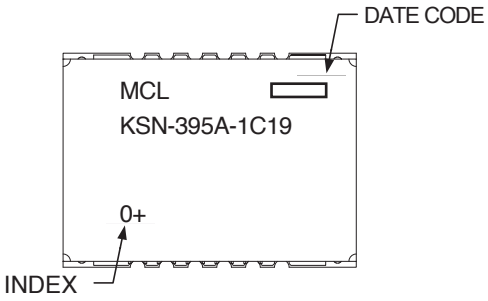
| Pin Number | Function |
|---|---|
| 1 | VCC PLL |
| 2 | GND |
| 3 | REF IN |
| 4 | GND |
| 5 | VCC VCO |
| 6 | GND |
| 7 | RF OUT |
| 8 | GND |
| 9 | LOCK DET |
| 10 | NOT CONNECTED |
| 11 | NOT CONNECTED |
| 12 | NOT CONNECTED |
| 13 | GND |
| 14 | GND |

## Recommended Application Circuit

Note: REF IN and RF OUT ports are internally AC coupled.



## Device Marking




## Additional Detailed Technical Information

Additional information is available on our web site. To access this information enter the model number on our web site home page.

**Case Style:** DK1042

**Tape & Reel:** TR-F28

**Suggested Layout for PCB Design:** PL-249

**Evaluation Board:** TB-567+F

**Environment Ratings:** ENV03T2